

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
29 April 2004 (29.04.2004)

PCT

(10) International Publication Number  
WO 2004/036147 A3

(51) International Patent Classification<sup>7</sup>: G01D 5/20

(21) International Application Number:  
PCT/GB2003/004504

(22) International Filing Date: 16 October 2003 (16.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0224090.1 16 October 2002 (16.10.2002) GB  
0308257.5 9 April 2003 (09.04.2003) GB

(71) Applicant (for all designated States except US): SEN-SOPAD TECHNOLOGIES LIMITED [GB/GB]; Harston Mill, Harston, Cambridge CB2 5GG (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): HOWARD, Mark, Anthony [GB/GB]; Sensopad Technologies Limited, Harston Mill, Harston, Cambridgeshire CB2 5GG (GB). SILLS, Colin, Stuart [GB/GB]; Sensopad Technologies Limited, Harston Mill, Harston, Cambridgeshire CB2 5GG

(GB). KREIT, Darran [GB/GB]; Sensopad Technologies Limited, Harston Mill, Harston, Cambridgeshire CB2 5GG (GB). JAMES, David, Alun [GB/GB]; Sensopad Technologies Limited, Harston Mill, Harston, Cambridgeshire CB2 5GG (GB).

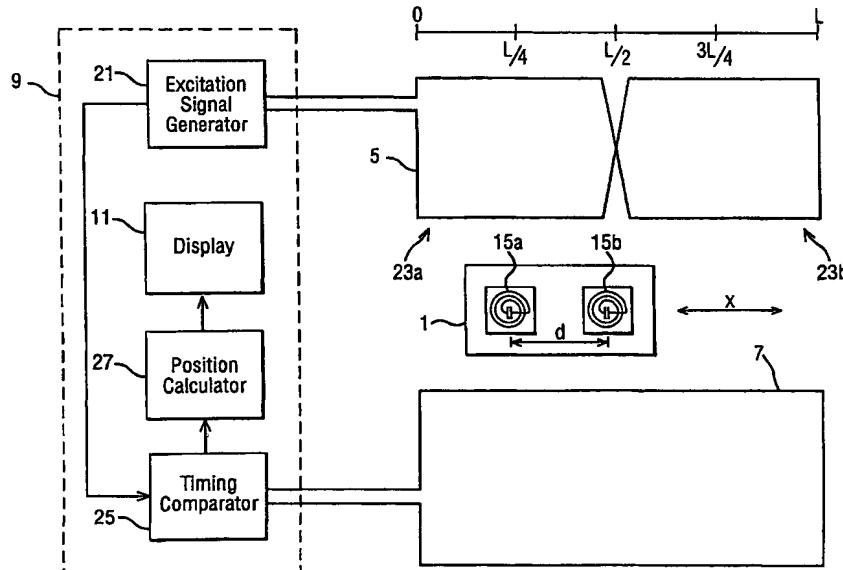
(74) Agents: BERESFORD, Keith, Denis, Lewis et al.; Beresford & Co., 16 High Holborn, London WC1V 6BX (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: POSITION SENSING APPARATUS AND METHOD



(57) Abstract: There is described an inductive position sensor in which a signal generator applies an excitation signal to an excitation winding formed on a first member, the excitation winding being electromagnetically coupled to at least two resonant circuits formed on a second member which are spaced from each other along a measurement path. The excitation windings are shaped so that the electromagnetic coupling between the exciting winding and each of the resonators varies along the measurement path. In this way, by applying an excitation signal to the excitation winding, respective different signals are induced in the resonators which depend upon the relative position of the first and second members.

WO 2004/036147 A3



**Published:**

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**(88) Date of publication of the International search report:**

5 August 2004

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/04504

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G01D5/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/77480 A (SCIENT GENERICS LTD ;MORRISON EUAN (GB); CLARK VICTORIA ANN (GB);) 21 December 2000 (2000-12-21) page 6, line 1 - line 26 page 11, line 1 - line 24 page 19, line 20 -page 22, line 1 claim 34 — —	1-7, 9-13, 15-20
A	US 5 815 091 A (ELY DAVID T ET AL) 29 September 1998 (1998-09-29)  column 1, line 4 - line 9 column 11, line 43 - line 47 column 13, line 67 -column 14, line 29 figure 11 — —	1-7, 9-13, 15-20

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the International filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the International filing date but later than the priority date claimed

\*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&\* document member of the same patent family

Date of the actual completion of the International search

19 May 2004

Date of mailing of the International search report

01/06/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Keita, M

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 03/04504

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 796 250 A (DAMES ANDREW NICHOLAS) 18 August 1998 (1998-08-18) abstract; figure 13 -----	1,2

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/04504

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 0077480	A	21-12-2000	AU EP WO GB JP US	5689900 A 1203204 A2 0077480 A2 2359139 A ,B 2003502628 T 6561022 B1	02-01-2001 08-05-2002 21-12-2000 15-08-2001 21-01-2003 13-05-2003
US 5815091	A	29-09-1998	AT AU AU AU BR CA CN DE DE DK EP ES WO HK JP SI US US US	165659 T 679378 B2 2451395 A 4435797 A 9507650 A 2189959 A1 1152954 A ,B 69502283 D1 69502283 T2 760087 T3 0760087 A1 2115382 T3 9531696 A1 1010796 A1 10500481 T 760087 T1 2002179339 A1 6249234 B1 6489899 B1	15-05-1998 26-06-1997 05-12-1995 26-02-1998 09-09-1997 23-11-1995 25-06-1997 04-06-1998 05-11-1998 22-02-1999 05-03-1997 16-06-1998 23-11-1995 25-06-1999 13-01-1998 31-10-1998 05-12-2002 19-06-2001 03-12-2002
US 5796250	A	18-08-1998	AT AU AU BR CA DE DE DK EP ES WO GR JP JP	163227 T 673429 B2 6579194 A 9406492 A 2161961 A1 69408534 D1 69408534 T2 696349 T3 0696349 A1 2112538 T3 9425829 A1 3026760 T3 3472578 B2 8509809 T	15-02-1998 07-11-1996 21-11-1994 09-01-1996 10-11-1994 19-03-1998 23-07-1998 23-09-1998 14-02-1996 01-04-1998 10-11-1994 31-07-1998 02-12-2003 15-10-1996